

RTCA Special Committee 186, Working Group 3
ADS-B 1090 MOPS, Revision A
Meeting #11

**RMF Enhanced Decoder Re-triggering Test Data
In Response to Action Item 10-12**

(Presented by John Van Dongen, FAA Technical Center, ACT-350)

SUMMARY
In response to Action Item 10-12, this paper contains the results of running the varying position re-triggering test with the RMF enhanced decoder with the flawed re-triggering mechanism (used to produce WP-10-16 figure 5). The purpose was to determine the ability of the varying position re-triggering test to reveal the weakness of a flawed re-triggering mechanism. In addition, this paper contains the results of running re-triggering tests with a new RMF enhanced decoder that includes a 6 microsecond dead time whenever it triggers.

Action item 10-12 is a request to run the re-triggering test conducted in WP-10-16 Figure 1 using the Enhanced decoder algorithm prior to the re-triggering improvement modification. This re-triggering test sets the 112-bit Mode S interference at -72 DBM and randomly varies its position relative to the extended squitter signal from -112 to -6.5 microseconds. The signal to interference ratio is varied according to the x-axis. The subject of discussion when the action item was assigned was whether the re-triggering test should require the interference signal to vary in position over a defined range, or require a series of tests with the interference signal at fixed positions. The test results of the latter type were shown in WP-10-16 figure 5 (shown here in figure 2) and it clearly revealed a weakness in the ability to re-trigger within 30 microseconds of a previous trigger. The purpose of the action is to determine how well a re-triggering test of the former type is able to reveal the weakness of the enhanced decoder prior to improving the re-triggering algorithm. Figure 1 shows the performance comparison (“RMF” vs. “RMF Old Retrig.”). The curves show a slight reduction in performance with the old method, but not as well as the comparison between figures 3 and 5 in WP-10-16.

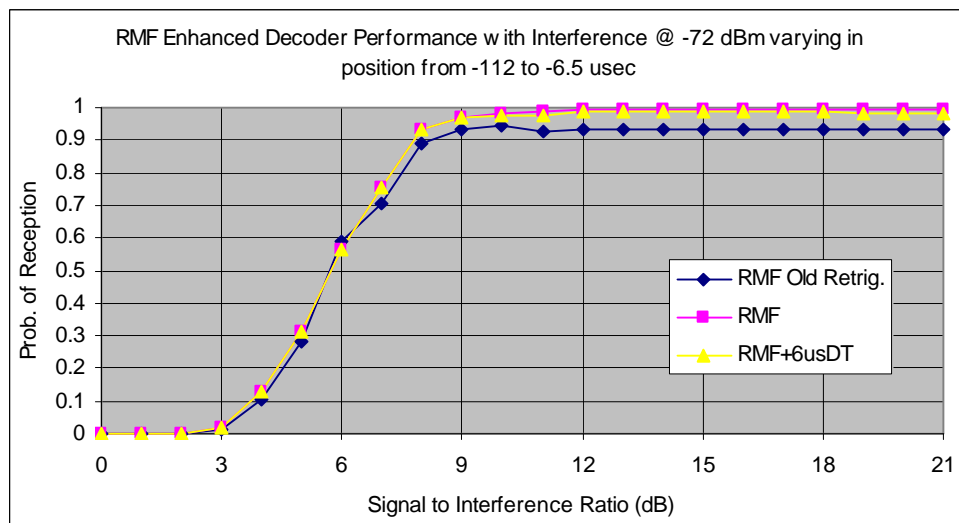


Figure 1 – A Comparison of Re-triggering Performance with the Old and New Re-triggering Algorithms

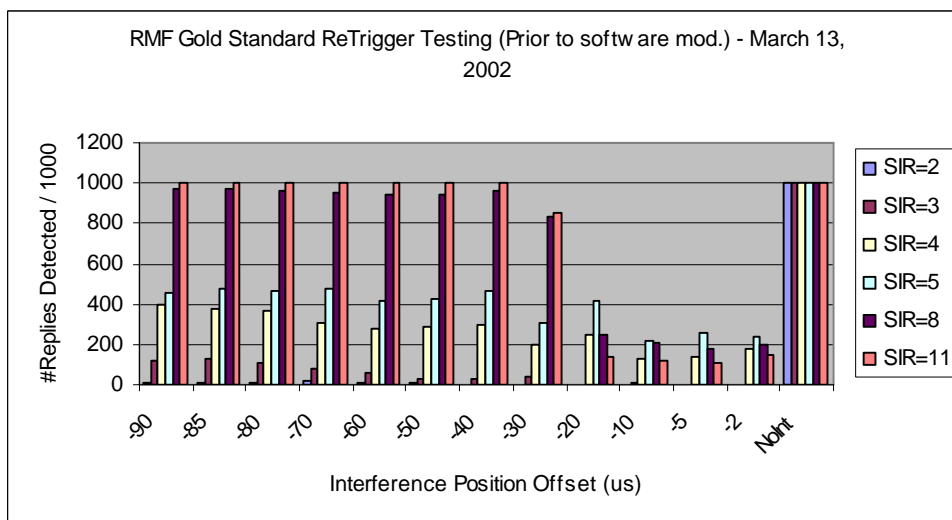


Figure 2 – WP-10-16 Figure 5 re-print

A 6-Microsecond Dead Time

A version of the RMF Enhanced Decoder has been developed that imposes a 6 microsecond dead time after all triggers. This was done out of concern that the ability of the RMF decoder to continuously trigger (and re-trigger) may not be realistically feasible (technologically and/or economically) with a real-time implementation. It was determined though input from avionics manufacturers that a minimum of 6 microseconds of processing time will be required to establish an amplitude reference level from a potential preamble. The amplitude is part of the re-triggering decision equation. During the 6 microseconds, the receiver will be unable to process any additional input. To emulate this, the RMF software was modified to ignore all potential preamble triggers within 6 microseconds of the lead edge of the first pulse of any previous trigger. The data labeled “RMF+6usDT” in figure 1 is the result of performing the varying position re-triggering test with the dead time modification. Figure 3 shows the results of performing the fixed position dead time test with the dead time modification.

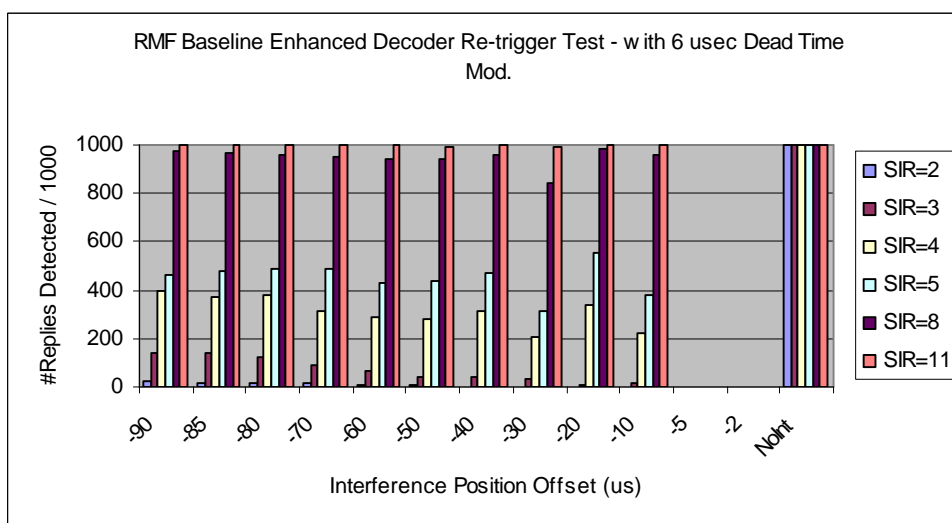


Figure 3 – Fixed Position Re-triggering Test with the 6 Microsecond Dead Time Modification